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### The Awakening of an Andean Tiger: Can Colombia's Recent Growth Create Jobs?

**Andrés Escobar**  
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# The Awakening of an Andean Tiger: Can Colombia's Recent Growth Create Jobs?

*Andrés Escobar*

## Abstract

Economic growth has been on the rise in Colombia and surpassed 6% in 2006 and 2007. Has growth been enough to absorb Colombian workers? Jobless growth seems to have marked Colombia's recent economic history. Over time, periods of high growth in Colombia have been associated with increases in employment. During periods of high growth (1974-80 and 1985-1994), one percent increase in Colombian manufacturing GDP translated into an increase of about 0.3 to 0.5 percent in employment. However, during the most recent growth period (2001-2005), permanent employment in manufacturing simply dropped. Growth in small firms, particularly those in light and heavy industries, producing for the domestic market was the one segment of the economy with employment growth over the latter period.

## Résumé

La croissance économique de la Colombie n'a cessé de croître ces dernières années surpassant 6% en 2006 et 2007. La question reste à savoir si celle-ci a été suffisante pour absorber la masse de travailleurs colombiens. L'histoire récente colombienne montre plutôt une croissance sans création d'emplois. Pourtant, les périodes précédentes de forte croissance économique en Colombie avaient généré de l'emploi. Pendant ces périodes de prospérité (1974-80 et 1985-1994), une augmentation d'un pourcent du PIB manufacturier colombien présentait une hausse de 0,3 pourcent de l'emploi. Cependant, lors de la dernière période de croissance (2001-2005), l'emploi permanent manufacturier a chuté. Ce ne sont que les petites entreprises, particulièrement celles dans l'industrie légère et lourde axées sur le marché intérieur, qui ont connu une croissance de l'emploi.

*About the author*

Andrés Escobar was IDRC's Globalization, Growth and Poverty Intern for 2008 and was posted in the Regional Office in Montevideo, Uruguay. He is currently a Ph.D. student at the Catholic University of the Sacred Heart in Milan, Italy.

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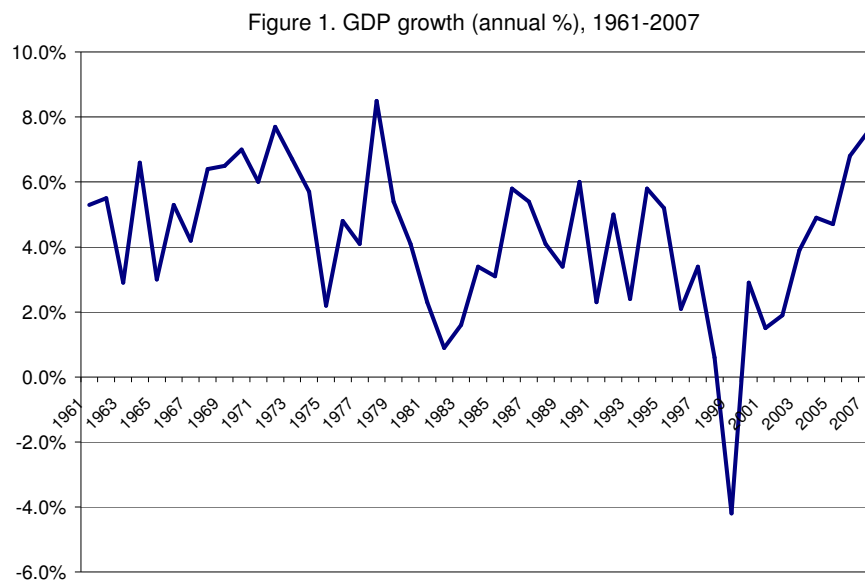
## 1. Introduction

Colombia's economic record makes it an exceptional case within Latin America. Until the late 1980s, the country displayed stable economic growth, with a high but steady inflation rate, and rates of both poverty and inequality that were high but slowly falling. The prudent management of coffee revenues helped to maintain low external debt and put Colombia in a better position than other Latin American countries during the so-called "lost" decade.

In the early 1990s, Cesar Gaviria's government (1990-1994) put into effect a set of policies to transform Colombia's economic structure. The main goal of the reforms was to stimulate growth and improve income distribution by reallocating resources towards more productive uses, weakening the national oligopolistic structure, and moving towards a more labour intensive industry. Among other things, the policies successfully opened Colombia to international markets and foreign investments, and reformed labour market legislation. In the late 1990s, during the government of Ernesto Samper (1994-1998), foreign capital inflows increased and banks channeled credits to the private (productive) sector. The following administration of Andrés Pastrana (1998-2002) suffered a decline in growth in 1999 (up to -4.2%). The Asian (and Russian) crises also had an influence given that foreign capital inflows to the country collapsed affecting the credit channel with undesirable effects for the economy.

At the beginning of 2000, GDP growth remained low (2.1%) with high unemployment and limited credit and public expenditures. Growth was not helped by the internal conflict with guerrilla forces which worsened as the peace talks between the government and the Revolutionary Armed Forces of Colombia (FARC) failed. After 2002, under the first mandate of Uribe Velez, output growth resumed which has been offset by a weak agricultural sector. Velez' increase in military expenditures negatively affected investment in health and education, but had positive effects on output growth because it concentrated efforts on disarming the extreme paramilitary forces and on fighting the guerrillas directly (FARC and the National Liberation Army). Since 2003 the

economic performance has improved, with average growth of 5.6% from 2003 to 2007. This was due to high oil and commodity prices and low interest rates in developed countries which helped to increase foreign capital inflows. In addition, in 2005, the unemployment rate declined to 12%, mainly due to a dynamic building sector.



Source: World Bank, World Development Indicators (on-line)

Has this growth record been enough to absorb employment? The paper will answer this question through the next four sections. Section two provides an overview of the Colombian labour market in the 1990s and 2000s. Section three describes the analytical framework used in the paper. Section four clarifies the use of data. Section five focuses on empirical results: the behavior of employment both for national and urban Colombia, and narrows down the analysis to the manufacturing sector in the 1974-2005 period while providing a breakdown by firm size and technological level. From this analysis, it will be clear that the awakening of one of the largest Latin American economies has yet to translate into good news for Colombian workers.

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## 2. The Colombian Labour Market: reforms in the 1990s and 2000s

Colombia, one of the most populated countries in the Latin American region, has an economically active population (EAP) of around 20 million people. The EAP has been declining in recent years, and the number of occupied workers now oscillates around 17.5 million workers. The economy creates around 300 000 new employment opportunities<sup>1</sup> each year; however, the working-age population is growing at 2% annually and so every year around 700 000 people enter into the labour market.

Unemployment has been a recurrent concern for the Colombian economy. Despite growth in output during the 1980s and mid 1990s, unemployment averaged around 10%-11%, and grew faster as the economy slowed down, reaching 20% in 2001. It has become more sensitive to changes in output since the last economic recession: increasing more during periods of contractions than decreasing during periods of expansions and tending to persist even when economic growth resumes. Aspects such as minimum wages, non wage costs, and public wages seem to have introduced more rigidity to wages at least in the salaried sector. This rigidity in wages coupled with an increased volatility in output seems to be the reason why the labour market tends to adjust more through quantities rather than wages (Diaz, 2005).

Nevertheless, wages increased considerably during the mid 1990s, declining with the recession, and finally recovering (though private salaried workers experienced no decline in wages). Improvements in wages have been focused mainly on skilled workers which have served to increase the wage gap and income inequality. In fact, the Colombian labour market has become increasingly segmented<sup>2</sup> which can be seen by the relative sizes of self employed and salaried workers. Also, the proportion of self-

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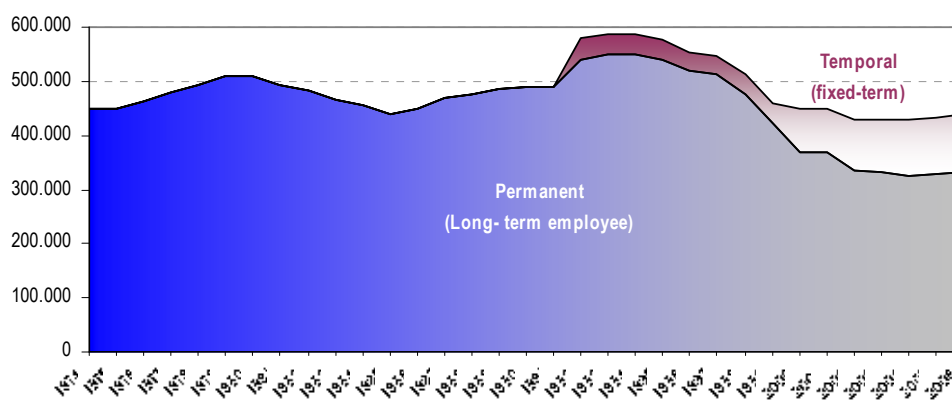
<sup>1</sup> According to the labour indicators published by DANE: multiple rounds of households' survey (2001-2008).

<sup>2</sup> In a labour market without rigidities, being self employed is a rational decision. Salaried employment and self employment, and relative wages between the two, should move in the same direction over time.



employed workers earning less than minimum wage has increased (World Bank, 2005). Evidence has proven that growth in minimum wages will augment the entire population's wage (considering the practice of indexing wage settings to multiples of the minimum wage); and it is negatively related to employment, especially for men. (Salas, 2004).

**Figure 2: Salaried Workers in the Colombian manufacturing industry**



Source: The Annual Manufacturing Survey ('EAM'), DANE.

The reforms implemented during the 1990s have introduced two major changes. First, **the 1990 labour reform (Law 50)** made the labour market more flexible by facilitating firing and hiring. From this increased flexibility, the formal labour market registered an increase in the employment exit rate and a reduction of the job tenure (Kugler, 1999). Second, **the 1993 social security reform (Law 100)** changed the system of health and pensions by determining the amount and distributions of the payroll contributions between the subsidized (lower income) and contributory (higher income) regimes in health and pensions depending on the income of the workers. These two reforms had two important and substantial effects. First, employment became more attractive and participation rates were raised; but with no change in labour demand, this caused a rise in unemployment. Second, by increasing labour costs, the reforms directly caused additional unemployment, re-enforcing labour market segmentation (World Bank, 2005). Also, the increased labour market flexibility allowed for the outsourcing of short

term employees. This could be an important part in explaining the drop in total level of employment that was witnessed in the late 1990s (below the half a million mark), as short term employees replaced regular, salaried employees (See Figure 2). Other reforms followed in the 2000s. **The 2002 labour reform (Law 789)** aimed to formalize employment and increase employment growth by reducing extra payments for night and holiday work, reducing firing costs, and introducing flexibility to non-wage costs. Also, a set of social protection measures was introduced, including the introduction of unemployment insurance.

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### 3. An Analytical Framework

Growth is critical for any country to reduce poverty rates; an increasing GDP per capita will shift mean income distribution away from a determined level of poverty. If inequality remains constant, poverty will decline specifically by this shift. Although, if a country cannot increase significantly (or maintain the same) growth rates, it may reduce poverty by reducing inequality. An economy that experiences positive growth rates and does not increase the income of the poor can be interpreted as growth with increasing inequality. But, on average, overall growth is good for the poor (Ravallion and Chen, 1997, and Sala-i-Martin, 2006).

According to economic theory, trade liberalization allows developing economies (which are labour abundant) to specialize in labour intensive sectors which serves to increase wages or expand employment opportunities. But this depends also on labour market rigidities that may not allow the expected sectoral reallocation of labour to happen<sup>3</sup>. These adjustments may occur through relative wage adjustments (rigid labour markets) or reducing firm profits (imperfect product markets) (Goldberg and Pavnick, 2004). Economic growth is important not only to improve populations' living standards but also to provide jobs. Overall growth reduces poverty by increasing mean income, where different rates of growth are translated into increasing productive capacity,

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<sup>3</sup> Public wages, particularly those in legislative and judicial branches, have introduced additional rigidities into the labour market by putting pressure on private sector wages.

creating more employment opportunities and also raising overall productivity. This process enables the economy to absorb unemployed workers and those entering the labour market (labour surplus) into the new economic sectors that are expanding. The workers will increase their income by moving to other sectors where economic expansion is taking place (new job opportunities) or by increasing their productivity in their current position (therefore increasing real wages). In this way, overall growth will benefit the poor and they, by increasing their current incomes, will be able to reallocate important resources to increase their educational and skills levels (including the household's members where they belong). Therefore, increasing the actual and future productive capacity of the workforce will determine future overall economic growth (Islam, 2004).

The present study analyzes at the macro level the interactions between GDP (Q) and employment (L) creation for the whole economy and major economic sectors; it will then be followed by a more focused analysis on the manufacturing sector. According to various authors (Noriega, 2001, and Ortiz, 2003), employment (L) is a function of output (Q, production or value added) and not only necessarily a function of wages.

$$\varepsilon_{L,Q} = \frac{\frac{\Delta L}{L}}{\frac{\Delta Q}{Q}} = \frac{\frac{\dot{L}}{L}}{\frac{\dot{Q}}{Q}} = \frac{Q}{L} \frac{\Delta L}{\Delta Q} \quad (1)$$

Where  $\varepsilon_{L,Q}$  results from the product between the average productivity of labour and the slope of the level of employment with respect to a marginal change in output.<sup>4</sup> When interpreting the employment elasticities, let us keep in mind that, when changes in output are positive (that is,  $\Delta Q > 0$ ):

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<sup>4</sup> Another method to estimate the employment elasticity of growth is the econometric estimation of a double-log linear equation relating employment (L) and GDP (Q), such as  $\ln L = \beta_0 + \beta_1 \ln Q$ . The regression coefficient  $\beta_1$  is the employment elasticity:  $\beta_1 = \frac{d \ln L}{d \ln Q} = \frac{dL/L}{dQ/Q}$ .

**Table 1. Elasticity, Employment and Productivity**

Elasticity ( $\dot{L}/\dot{Q}$ ) or $\varepsilon$	Change in $Q > 0$
$\varepsilon > 1$	(+) Employment (-) Productivity
$0 \leq \varepsilon \leq 1$	(+) Employment (+) Productivity
$\varepsilon < 0$	(-) Employment (+) Productivity

Source: Author.

Several factors affect the growth rate of employment ( $\Delta L/L$ ) given the growth rate of value added.<sup>5</sup> The patterns of growth followed by different sectors have varied impacts on employment creation, which also depends on the technological level of the productive activities. As it happens in most developing countries, the economy is characterized by the coexistence of differentiated productive technologies within the same sector: those capital-intensive with those units using more labour-intensive technologies. The modern productive units are located in the formal sector which uses capital intensive technologies, hires paid workers and is oriented to international markets. These coexist with other small scale productive units characterized by being located largely in the informal sector which is more labour intensive and oriented to the domestic market. An indicator that measures the relation between employment growth and output growth is the employment elasticity of output growth. It implies that when economic growth is labour intensive, it is due to the expansion of certain economic sectors with high employment elasticity. However it is important to mention that employment elasticity reflects the inverse of labour productivity. Despite some qualifications of this measure, it is still worth examining the trend in employment elasticity with respect to output growth at the national level. One important reason is that from the perspective of poverty analysis, while the growth of output is an important concern, it is also important to determine whether output growth creates employment or not.

$$\dot{L} = \alpha \dot{Q} - \dot{w} + (\alpha - 1)\dot{P}_p + (\dot{P}_p - \dot{P}_c) \quad (2)$$

Where  $L$  is employment;  $Q$  is production (or value added);  $w$  is the real wage;  $P_p$ , producer prices index;  $P_c$ , consumer prices index, and  $\alpha$  is a technological and

<sup>5</sup> For a detailed explanation of the model, please refer to Annex 1.

behavioral parameter. Equation 2 has four terms or effects, which are described below (Table 2).

**Table 2. Decomposition of Employment Growth**

Effect	Term	Component and Sign	Component and Sign	Comments
(1) Output (or value added)	$\alpha \dot{Q}$	$\alpha$ +	$\dot{Q}$ +	A higher wage share and positive output or value added growth have positive effect on employment growth. If growth in value added is negative, employment growth will be affected negatively with higher real wage growth.
(2) Wage	$\dot{w}$	$\dot{w}$ -		The trade off will be effected negatively on real wages with higher employment growth, since the wage bill of workers will be shared with more workers.
(3) Wage share	$(\alpha - 1)\dot{P}_p$	$\alpha$ +	$\dot{P}_p$ +	If the wage share is less than one, the positive effect of producer price inflation is adversely affected by a rising share of capital
(4) Domestic terms of trade (DRER)	$\dot{P}_p - \dot{P}_c$	$\dot{P}_p$ +	$\dot{P}_c$ -	If consumer price inflation is higher than producer price inflation, employment growth and real wage are negatively affected

Source: Based on Mazumdar and Van Severter (2003)

The domestic terms of trade (DRER) are one of the key variables of the employment elasticity that is determined exogenously; both producer and consumer prices are given to the firm. The other two variables (wage share and wage) are labour market variables that determine the level of employment.

Decision-making at the firm-level is important to determine the supply of work which depends on the number of workers and the supply of efficiency units-per-worker. Those depend on the optimum labour supply for a given wage bill and external factors such as labour legislation that affect decision-making and the relationship between employers and employees. At the same time, the choice of techniques is influenced by wage costs for the respective investment, which determines the output (or value added) for the planned input of capital and labour. In equilibrium, value added must be enough to support the wage bill and the profit share to finance investment.

It is in this way that investment responds to expectations of market trends in a pro-cyclical way. Given that the share of wages is determined by investment, it would follow an anti-cyclical pattern. In buoyant periods investment tends to increase with falls in the share of wages, therefore reducing employment elasticity. Regarding

employment, and given the various types of labour contracts, the core body of salaried workers or firms' labour stock is slow to respond to changes in the market given the considerable costs of firing and hiring. As with investment, the core body of permanent workers is based on perceptions of expected demand. Higher expectations during periods of prosperity would lead to an increase in labour demand; during downturns, expectations would reduce the size of the labour component, and meet their demand for labour input by increasing wage-per-worker. Then, employment has a pro-cyclical behavior, which expands during upturns and contracts during adverse expectations. Employment elasticities then, are affected by economic cycles. During upturns, the wage share tends to decrease, leaving fewer resources to expand labour or wages, but this trade-off inclines towards employment growth.

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## 4. Data

Historical data is available for urban areas from 1976 to 2000 for seven main cities, extracted from multiple rounds of households' surveys and from 2000 to 2005 for 13 metropolitan areas (main cities surrounded by near municipalities), given the changes in methodological data collection implemented by Colombia's statistics office, the Departamento Administrativo Nacional de Estadística (DANE). These data are grouped in 9 sectors: Manufacturing, Building, Commerce, Transport, Financial services, Government services, Personal services, and Agriculture and Mining (these include those not responding to the survey).

Regarding the manufacturing sector, time series data is available from the Annual Manufacturing Survey (1975-2005) undertaken by DANE since 1956. In these surveys, firms are asked to provide information regarding: number of employees, labour and non labour costs, production, consumption of intermediate goods, value added, energy consumption and net investments. It considers those firms that have more than 10 employees and a production over a determined level (115.5 million Colombian pesos in 2005). The number of employees is classified under salaried workers (fixed term or temporary and long-term or permanent employees) and total employment (includes paid workers, firms' owners, family workers without pay, and external employees from

outsourcing firms). In this paper, when analyzing the manufacturing sector, 'employment' means salaried workers (those permanent and temporal hired directly by firms) since data on wages are only available for this type of worker.

The latter distinction does not consider those short-term employees hired through outsourcing firms (and explains the drop in employment as short-term employment replaced regular salaried employment). This information is grouped by industrial sector and by firm size.

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## 5. Empirical Results

The following table presents data regarding employment and output growth, for the period 2001-2007. The patterns of growth remain almost unchanged: commerce, manufacturing, and building sectors act as major contributors to overall economic growth. The role of transportation has increased considerably (both in GDP and employment growth) and, since this sector has an intermediate employment creation capacity has contributed also in absorbing labour from other sectors.

In recent years, since output growth resumed, Colombia has not been able to generate a dynamic relation between growth, employment, and productivity: one percent increase in GDP represents one third in total employment (the economy has grown at an average rate of 5.4% while employment grew at an average of 1.6%). While the engines of growth have been manufacturing, commerce, and building (growing at rates above 10% in 2007), employment presents more varied outcomes. Commerce presents the lowest employment elasticities followed by manufacturing, building, and transportation, suggesting that labour productivity has increased in the same order. The role of manufacturing increases since it is the one that may present more technological progress compared to building and could provide jobs of better quality. Despite the important growth of commerce, the impact on employment has been quite limited.

**Table 3: Total National Employment and Economic Growth (2001-2007)**

Economic Sector	GDP rate of growth ( $\dot{Q}$ )	Employment rate of growth ( $\dot{L}$ )	Employment Elasticity of growth ( $\dot{L}/\dot{Q}$ )
Agricultural, fishing, cattle and hunting	3.40	-0.99	-0.29
Mining	0.48	-6.42	-13.33
Manufacturing	6.12	2.51	0.41
Electricity, gas and water	2.72	1.48	0.55
Building	12.11	6.69	0.55
Commerce, restaurants and hotels	6.89	1.29	0.19
Transportation, storage and communications	6.67	6.03	0.90
Financial, firm services and	5.62	7.63	1.36
Social, community and personal services	2.61	1.10	0.42
<i>Total (National)</i>	<i>5.37</i>	<i>1.64</i>	<i>0.31</i>

**Notes:** GDP is in 2000 constant pesos. Employment values are computed from DANE's continuous household surveys available only from 2001. Values are annual average rates of growth.  
**Source:** Computed from DANE data.

In general, employment has grown at lower rates compared to sectors' output growth and even in some cases at negative rates (agriculture, and mining). From those sectors classified with low employment capacity creation (financial services, mining, and electricity), financial services exhibit better performance in both economic and employment growth. However, this increase in employment has been at the expense of decreasing labour productivity, where jobs created have been of lower quality.

To increase employment elasticities in certain activities may not be the primary objective because this will be reflected in reducing productivity in an economy that can already be characterized by persistent low levels of labour productivity. With respect to the changes in employment elasticities through time, they should fall gradually as the country becomes more industrialized and less labour abundant. The elasticity values can be useful regarding macroeconomic performance. As an example: if GDP grows at 4% per year with an employment elasticity of 0.75, this will allow increasing employment at 3%, above the labour force growth rate in Colombia. In fact, sustained economic growth for long periods of time would allow the economy to absorb the surplus of labour into the modern sectors, according to Lewis.



### a) All Sectors in Urban Colombia

The analysis can be undertaken for a longer period of time (1976-2005) focusing on data that covers only urban areas. In the period 1965-1995, the average rate of growth of the economy was 4.7%, mainly concentrated in intermediate employment-intensive sectors. The rest of the sectors experienced output growth rates around the mean with the agriculture/mining sectors performing poorest in this period. The manufacturing sector plays a larger role in urban areas, since with an import substitution regime, firms tended to concentrate near major internal/domestic markets (Table 4).

**Table 4: Total Employment and Growth elasticities, 1976-2005**

Economic Sector	GDP Growth ( $\dot{Q}$ )				Employment Growth ( $\dot{L}$ )				Employment Elasticity of Growth ( $\dot{L}/\dot{Q}$ )			
	1976- 1979*	1980- 1989*	1990- 1999**	2000- 2005**	1976- 1979	1980- 1989	1990- 1999	2000- 2005	1976- 1979	1980- 1989	1990- 1999	2000- 2005
Agriculture and mining	4.75	4.34	2.37	1.53	3.78	6.65	5.02	-4.04	0.79	1.53	2.12	-2.64
Manufacturing	5.84	2.83	0.62	4.02	5.22	5.47	1.45	2.67	0.89	1.94	2.33	0.66
Electricity, gas and water	8.01	4.82	1.76	2.76	2.99	7.23	0.21	1.72	0.37	1.50	0.12	0.62
Building	1.50	3.68	-0.36	10.72	7.00	5.53	1.44	6.28	4.67	1.50	-4.06	0.59
Transportation	9.15	2.79	3.42	4.03	6.09	5.80	3.36	7.36	0.67	2.08	0.98	1.83
Commerce	4.92	2.43	0.91	4.92	9.85	6.86	3.05	4.91	2.00	2.83	3.35	1.00
Financial services	5.76	4.14	3.55	3.73	10.60	7.57	2.47	12.70	1.84	1.83	0.70	3.41
Community and personal services	5.92	2.44	4.32	2.49	2.73	5.71	4.39	-1.94	0.46	2.34	1.02	-0.78
Government services	6.48	5.16	9.12	0.52	0.75	4.51	1.97	2.70	0.12	0.88	0.22	5.19
<b>Total</b>	<b>6.00</b>	<b>3.48</b>	<b>2.76</b>	<b>3.37</b>	<b>5.65</b>	<b>5.94</b>	<b>2.75</b>	<b>2.95</b>	<b>0.94</b>	<b>1.71</b>	<b>1.00</b>	<b>0.88</b>

**Source:** Authors' calculations based on data published by the Departamento Nacional de Planeación (on-line).

**Notes:** Annual average growth rates. Based on multiple rounds of national household's surveys: from 1976-2000 for the 7 main cities, and from 2000-2005 for 13 metropolitan areas: Barranquilla (Atlántico), Bogotá (Distrito Capital), Cali (Valle), Medellín (Antioquia), Bucaramanga (Santander), Manizales (Caldas) and Pasto (Nariño). \* indicates GDP values in 1975 constant million of pesos and (\*\*), GDP values in 1994 constant million of pesos.

During the mid 1970s, output growth came alongside employment creation, particularly in manufacturing, building, commerce, and financial services. In the 1980s, the economy experienced a slow down (3.5%) while employment increased at an average rate of 5.9% suggesting that overall labour productivity declined considerably. This decline in output growth was mainly due to the slow down of manufacturing, energy, transportation, commerce and financial services. This period can be conceptualized as one in which all economic sectors suffered major losses in labour productivity since employment grew faster than output growth. During the 1990s, important events and reforms can be associated with the weaker labour demand: 1) an exchange rate appreciation and labour legislation reforms that made job creation for less skilled

workers more difficult; 2) a tendency of domestic industry to invest in more capital-intensive technology, due to economic integration and reductions in tariffs; 3) a gradual recomposition of productive activities toward more capital-intensive activities, as production shifted from agriculture and industry to mining and services; and 4) an increasing corporate tax rate during the 1990s. In fact, employment growth tended to decrease faster than output growth compared to the 1980s (considering that in the previous period employment grew almost twice of output growth).

In urban Colombia, a one percent increase in GDP has represented a 0.88 increase in employment in recent years. Nevertheless, these values represent the lowest in the last 30 years. With respect to manufacturing, one percent increase in GDP represents 0.66 increase in employment, lower when compared to previous periods. It shows the most appropriate level of employment elasticity of growth compared to other sectors suggesting that increases in employment came alongside increases in labour productivity, with positive effects on job quality.

An important aspect is that total employment in urban areas is influenced by increasing informality and self-employment as suggested by recent empirical evidence. Nevertheless, employment growth is concentrated in main urban areas given the higher values when compared at the national level. The engines of growth (building, manufacturing and commerce) have played a key role in generating employment opportunities by absorbing labour from other sectors (mainly agriculture), particularly in urban areas. Regarding manufacturing, the higher employment elasticities in urban areas, means also that a large proportion of workers are involved in informal activities within informal businesses, characterized of being micro-enterprises.

## **b) Manufacturing Sector**

During the 1970s and 1980s, different economies present a different trade-off between wage growth and employment growth in manufacturing. OECD countries for example, have favored real wage growth for those already employed at the expense of

employment growth. Sub Saharan Africa on the other hand, has favored employment growth instead of real wage growth at the cost of falling real wages in both periods of 1970s and 1980s given the limited output growth. In the particular case of South Africa (Mazumdar and Seventer, 2005), growth was shared between employment and wage growth during the 1970s and after this period, followed the same pattern of OECD countries. East Asia is the region of the world that had the highest rates of output, real wage, and employment growth. There is no doubt that Asian countries led the world in their rate of growth, particularly in manufacturing, by a wide margin. Latin America and the Caribbean presented lower rates of output growth (the lowest in both periods compared to other regions of the world) with adverse effects on employment growth and real wages. Besides this limited growth in output, the negative effects of prices have played a key role in diminishing employment growth and wages even more.

In the 1970s, Colombia had an output growth above the median of the region, being shared in both employment and real wage growth<sup>6</sup>, with a share of wages growing at almost the same rate as value added ( $\alpha$  close to 1). During the 1980s, it performed similarly to the OECD pattern, favoring more real wage growth at the expense of employment growth. The 'price effect' was not relevant for the country (as it was for the region) because the domestic terms of trade were favorable to the producers having positive effect on employment and wages. In fact, the price effect in Colombia was relatively similar to that of East Asia in the 1970s, and similar to the OECD countries in the 1980s, both considered lower than LAC's regional average. In LAC (in contrast to other regions), the wage bill was growing at almost the same rate of output ( $\alpha=0.97$ ), and for Colombia was 0.99 and 0.92 during the 1970s and 1980s, respectively. But these favorable values for the region were diminished drastically by the high levels of inflation, which reduced real wages. During the 1980s and the 1990s, Colombia tended to increase wages induced mainly by the increase in capital intensity and/or technical progress. This raised the marginal product of labour, and hence wages, and increased the demand for skilled labour. Additionally, it is possible that the presence of efficiency wages, institutional factors (eg. pay roll taxes), and the presence of strong trade

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<sup>6</sup> Even though, these values were not able to reach the same rates of those in East Asia.

unions, pushed wages up in favor of those already employed at the cost of declining employment growth.

**Table 5: Determinants of Salaried Employment Growth in manufacturing**

PERIOD	(1) Output effect ( $\alpha \dot{Q}$ )	(2) Real Wages ( $\dot{w}$ )	(3) Wage share effect ( $(\alpha - 1)\dot{P}_p$ )	(4) DRER ( $\dot{P}_p - \dot{P}_c$ )	$\alpha$	Price effect	Employment ( $\dot{L}$ )	Output Value Added ( $\dot{Q}$ )	Elasticity ( $\dot{L}/\dot{Q}$ )
I: 1974-1980	4.77	1.23	-1.17	-0.55	0.94	-1.72	1.82	5.07	0.36
II: 1980-1985	1.02	3.08	-0.41	0.08	0.98	-0.33	-2.39	1.05	-2.28
III: 1985-1994	5.49	0.92	0.39	-2.04	1.02	-1.65	2.92	5.39	0.54
IV: 1994-2001	0.14	0.37	-2.88	-0.16	0.77	-3.04	-3.27	0.18	-17.74
V: 2001-2005	3.87	2.11	-1.94	-0.56	0.54	-2.5	-0.75	7.23	-0.1
1974-2005	3.79	1.55	-1.48	-0.86	0.92	-2.34	-0.1	4.14	-0.03

**Source:** Author's calculations based on multiple rounds of the annual manufacturing survey ('EAM'): Only are considered those employees hired directly by firms (long-term and fixed-term employees).

**Notes:** \*DRER=domestic terms of trade; \*\*Output effect:  $\alpha \dot{v}$ ; \*\*\*Price effect:  $(\alpha \dot{P}_p) - P_c$

After the labour reform period (1990), firms were allowed to employ temporary workers in an attempt to increase the demand for unskilled labour. In fact, labour demand increased substantially until 1993 (accordingly with the social security reform that determined payroll contributions), and then decreased with the contraction of the economy. The composition of employment has changed towards temporary workers because of institutional aspects (such as labour costs) and labour demand (as reflected in the frequency of the economic cycle).

It is important to recapitulate the importance of the price effect, which had particular relevance in the Latin American context. It enters into the decomposition model in two different ways:

1. The wage share effect is positive or negative depending on the wage share of output,  $\alpha$ , if it is less or more than 1. But the magnitude of the effect depends on the rate of growth of producer prices.
2. The domestic terms of trade (DRER), is governed by the increase in consumer prices (which affects real wage) relative to that of producer prices (labour costs).

**Period I** (1974-1980) can be described as a period of **good growth**: with a growing output (real value added) at around 5% per annum that doubled the regional average.

This period was also characterized with an adverse trend in domestic terms of trade (DRER) affecting real wages. The value of  $\alpha$  below the unity means a negative share of wages in output (value added or VA). But in overall performance, output growth was shared between employment and real wage growth.

In **Period II** (1980-1985), the **decline in output** (VA) influenced employment growth, despite the positive trend in the DRER that positively affected real wages. Nevertheless, the contraction in employment growth favored real wages since the wage bill was divided between fewer workers.

**Period III** (1985-1994), a period of **growth with jobs**, registered improvements in output (VA) and in employment growth, while real wages have been undermined by the adverse trend in the DRER, which in fact was the highest among all periods of analysis. The value of  $\alpha$  was closely above unity reflecting a positive share of wages in output (VA), where the favourable producer price inflation was shared between real wages and capital. The employment elasticity of output (VA) seemed to be affected positively by the labour reform (1990).

**Period IV** (1994-2001), during the last **recession**, the employment elasticity turned negative (employment fell drastically) as happened in period two. Output increased faster than workers' wage bill ( $\alpha=0.77$ ), suggesting that producer price inflation had been appropriated mainly by capital. The persistent adverse trend in the DRER, even though it was controlled at the end of the period by adopting monetary policies to control inflation, has affected wages and must be considered as the main factor tending to dampen the value of employment elasticity after the first period (as happened in other countries in the region). These outcomes explain in part the decline of labour demand in urban Colombia during the second half of the 1990s.

**Period V** (2001-2005) is the **jobless growth** period. Output improved due to the dynamics of internal demand and growing exports. In fact, output growth (VA) shows the highest rates among periods, favoring more real wage increase at the expense of

employment growth. Additionally, the unfavorable DRER undermined employment growth. The value of the share of wages continued to decrease considerably, suggesting that wages did not grow at the same rate as output mainly because of the increase in the investment ratio (negative wage share effect), where the benefits of producer price inflation were appropriated by capital in the form of gross operating surplus. Labour costs play an important role, since average labour costs have increased more than 30% compared to average wages given the reforms.

### **c) Technological Level and Trade Orientation in Manufacturing**

In Latin America, the expansion and promotion of exports can be associated in the last 50 years with two major characteristics: a) those products with comparative advantages associated with natural resources and labour intensive activities, and b) the governmental protection oriented to domestic markets for those sectors intensive in scarce factors: capital and highly skilled labour. Under these conditions, some products have entered successfully into international markets, particularly in regional markets given the lower transportation costs and preferential trade agreements (eg. Community of Andean Nations and Mercosur).

Colombia's exposure to international markets depended substantially on coffee exports until 1986. This aspect determined monetary policy and exchange rates given the fluctuations in international coffee prices. Under these conditions the role of more diversified export-oriented sectors was important given the dependency on the performance of the coffee sector, suggesting that the fluctuations in international prices could undermine the performance of non-coffee exports due to fluctuations (and volatility) on exchange rates.<sup>7</sup>

Since the 1990s, total exports increased substantially as did the share of manufacturing products in total exports. Nevertheless, the diversification and volume of exports were diminished by low productivity gains and the appreciation of the local

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<sup>7</sup> El Crecimiento Colombiano en el Siglo XX (1999).

currency<sup>8</sup>. The performance of Colombia's non-traditional exports<sup>9</sup> had varied outcomes. During the 1980s, the mining exports increased substantially which affected the manufacturing share in total exports, but from the second half of the 1980s manufacturing exports increased and in 1999 represented 61% of total non-traditional exports. Within the industrial sector, those sectors that had relatively high shares in total exports included: chemical products, clothing, paper & paper products, sugar, leather products, and textiles.

Manufacturing industries are grouped into three classes that loosely follow the factor contents of means of production: light industry (or labour intensive), heavy industry (or capital intensive) and high-technology industries. All three sectors were dynamically growing during the 1970s, with heavy industry taking the lead, and gradually falling during the 1980s. During the 1990s, heavy industry achieved an annual average growth rate of 5.1% while the high-tech industry faced a negative growth rate in the second half of the 1990s. In recent years, the latter has taken the lead in output (VA) growth, doubling the average growth of the manufacturing sector as a whole. Employment growth has been declining since the 1970s, though the high-tech sector has performed better than the others. This declining trend was present until 2005, and was initiated slowly during the 1980s and was worst during the 1990s, with negative employment elasticities for both periods. After the recession, heavy and high-tech industries presented positive (but low) employment elasticities.

Another important aspect to consider is trade exposure, given that reforms brought more exposure to international markets and also access to capital and intermediate goods. More than **one half** of total manufacturing output is classified under **light-technology exposed industries**, almost **37%** are **heavy (capital intensive)**

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<sup>8</sup> For Edwards (1994), the currency appreciation in the region during the post reform period had in its main causes the massive incursion of capital and the use of the exchange rate as an anti-inflationary tool. For Colombia, the expansion in public expenditures probably was the main factor for revaluation during the 1990s.

<sup>9</sup> Colombia's non-traditional exports are grouped in three subgroups: agricultural, manufacturing and mining. In concordance with the agricultural sector includes cotton, rice, flowers, tobacco, meat fruits and vegetables; manufacturing includes: food and beverages (included sugar), textiles, clothing, rubber and plastic products, leather, wood, paper, media, chemical products, non metallic minerals, basic metals, machinery and equipment, and transport. And the mining sector includes: oil and products, coal, and emeralds.

**industries** (where 24% is concentrated in exposed heavy-industry) and nearly **12%** are **high-tech industries**. In 1994, food products and beverages represented almost half of total exports and more than a quarter of total output.

**Table 6. Salaried Employment, Elasticities by Technology and Trade Exposure, 2001-2005**

Technology level	Employment growth ( $\dot{L}$ )	Real Value Added growth ( $\dot{Q}$ )	Elasticity ( $\dot{L}/\dot{Q}$ )
High-Tech Industry	1.10	6.48	0.17
Heavy Industry	1.21	5.01	0.24
Light Industry	-1.00	3.50	-0.29
Technology level and exposure to trade	Employment growth ( $\dot{L}$ )	Real Value Added growth ( $\dot{Q}$ )	Elasticity ( $\dot{L}/\dot{Q}$ )
High-Tech	1.10	6.48	0.17
Heavy Industry Exposed	0.83	5.63	0.15
Heavy Industry Domestic	1.73	3.57	0.49
Light Industry Exposed	-1.14	3.38	-0.34
Light Industry Domestic	1.32	4.70	0.28

**Source:** Author's calculations based on multiple rounds of the Manufacturing Survey (EAM). See Annex 2 for different time periods.

**Notes:** **Light Industry** - Food and Beverage products, tobacco products, textiles and clothing, leather and shoes products, wooden products, furniture, and paper and printing. **Heavy Industry** - Chemical and other chemical products, refined petroleum products, rubber and plastic products, non-metallic mineral products, glass and glass products, basic metal products, basic precious and non-ferrous metals, fabricated metal products. **Hi Tech Industry** - Machinery and equipment, electrical machinery and apparatus, motor vehicles and other transport equipment, medical and precision instruments, and manufacturing (not classified elsewhere)

During the reforms period (first half of the 1990s), those sectors with more exposure to international markets performed better in terms of real value added and employment growth (higher employment elasticities) when compared to those domestically oriented, particularly high-tech and heavy industries (in value added growth). Surprisingly, after the recession, labour demand tended to adjust slowly as output resumed; only the heavy and high-tech industries show reduced (but positive) employment growth rates. They present increases in labour productivity (therefore raising real wages). A higher investment ratio may have reduced the employment effect. It is evident that reforms have favored those sectors more technologically advanced in terms of output and employment growth. Light industry (labour intensive) has benefited less from more international exposure, with a marked decline in employment growth.



Those sectors exposed to international markets experienced considerable output growth. At the same time, to be more competitive globally, they had to increase labour productivity diminishing the positive effects of employment growth. Light industry exposed to international markets accounts for the major increases in labour productivity since the core body of tenured workers declined considerably. This explains the negative outcomes in employment elasticities of total manufacturing given that light industry represents more than 50% of the manufacturing sector as a whole.

The country's efforts to diversify the production structure began when problems arose given the high degree of export-dependence on a commodity (primary) product such as coffee. These efforts took place mainly at the end of the 1960s through institutional mechanisms such as export subsidies and exchange rates incentives<sup>10</sup>. Firms can be classified in three subgroups related to trade performance in the last decade: a) Successes (flowers, sugar, clothing, media, and chemical products); b) failures (cotton, and textiles); and c) others (leather goods and non electrical machinery)<sup>11</sup>.

When trade orientation is considered, international exposure brought gains in output growth despite labour intensities. In fact, output and labour productivity increased far more in those exposed to the international market than those oriented to the domestic market. Heavy and light industries that are domestically-oriented have performed better regarding employment creation: a one percent increase in output represents a one-half to one-third increase in employment respectively; where market knowledge and brand positioning, low transport costs near domestic markets, and tradition may

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<sup>10</sup> The institutional mechanisms that have supported export diversification until 1998 were: export subsidies such as 'Certificados de Abono Tributario-CAT', 'Certificados de Reembolso Tributario-CERT', and Plan Vallejo (tariff exemptions for intermediate goods); and exchange rates incentives. Export subsidies initiated in 1998 a gradual reduction until disappear in 2002 mainly due to the country's agreements with the WTO without leaving aside the high fiscal costs and sectoral distortions that have accompanied them. The available financial resources from these changes are used to increase productivity in the long run of those export oriented sectors. (Ochoa, 1998).

<sup>11</sup> The 'others' subgroup draws on Berry and Escandon (1994) that have carried out a micro level study of the SME sector. It includes leather and non electrical machinery, since the former is a mainly export oriented sector and the latter is a high tech sector exposed to international markets. The shares in total non-traditional exports are lower compared with those 'successes' or 'failures' examples but are worth examining under the light of their export tradition and orientation to international markets before and after the reforms.

play a key role in this regard. Nevertheless, output growth has not achieved the same levels of periods I and III. Those manufacturing subgroups known as “**export successes**” (plastics, clothing, paper & paper products, and other chemical products) can be also catalogued as “**employment successes**”, since they have been creating job opportunities for Colombian workers despite labour regulations. Other subgroups, characterized by exposure to international trade and competition, can enter into the same category given their adequate levels of employment creation: furniture, machinery and equipment, food and beverages, and leather shoes.

#### **d) Small and Medium Scale Manufacturing Sector**

The type of analysis by size class of firms has not been done for many other countries. Mazumdar and Sarkar (2004) have undertaken a similar exercise for the post liberalization Indian manufacturing sector (1984-1994). Mazumdar and Van Seventer (2003) carried out a similar exercise for the South African manufacturing sector (1972-1996) for the whole sector and desegregating at the international 2-digit industry classification level. The similarities with the Indian experience and with the South African experience is that output growth was stronger within the SMEs than large firms particularly in small firms as it happened in South Africa and Colombia (period III). It seems that with (and after) trade liberalization, there has been a shift of output to smaller firms in the three countries. It is reflecting the world's tendency, noted in the US, that smaller firms have taken the lead in output growth in manufacturing. During recent years of economic expansion in Colombia, large firms (>200 employees) have also been growing at higher rates than those smaller establishments<sup>12</sup>.

The trade-off between employment growth and wage growth has tilted to wage growth in small firms. In the Indian case, there is some evidence that the supply price of labour in the informal sector has increased, which pushes wages up in the small scale sector.

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<sup>12</sup> According to the Law 590 (1994), SMEs are classified as follows: small (11-50 employees) and medium (51-200 employees), large firms are considered above 200 employees. For analysis purposes large firms are classified in large (200-499 employees) and very-large (above 500 employees). Those establishments with less than 10 workers surveyed in DANE's manufacturing survey do not represent the whole population given classification aspects such as, e.g. production levels and sales. A special survey is carried out by DANE for micro-establishments since 2005.

For South Africa, it has been argued that institutional policies and legislation favoring wage growth among the less well-paid sectors of industry may be the reason. The Colombian case presents similarities: institutional aspects and labour legislation may play a crucial role in affecting labour demand in small businesses (minimum wages indexation practice, and pay roll contributions). Another reason could be that as small firms grow faster, they may need to upgrade the skills of their labour force to meet the market challenges.

In terms of employment, the SME sector represents almost half of the total employment in manufacturing; the number of small firms exceeds the number of firms and greatly exceeds the number of large and very large firms. The differences in labour productivity are important: until 1995, small firms increased their labour productivity, but in 2005, large and very large firms increased far more labour productivity than SMEs, widening the gap between size classes.

**Table 7. Size and Productivity, Colombian manufacturing, 1995-2005**

Size of establishment (number of workers)	1985 Labour Productivity (Million of 1999 pesos)		1995 Labour Productivity (Million of 1999 pesos)		2005 Labour Productivity (Million of 1999 pesos)	
From 10 to 49	13.8	100	20.7	150.0	29.6	214.5
From 50 to 199	21.4	100	31.3	146.3	43.8	204.5
From 200 to 499	32.3	100	45.9	142.1	82.1	254.2
>500	42.4	100	60.4	142.4	114.6	270.2
Total	16.3		25.1		38.6	

Source: Author's calculations based on multiple rounds of the Manufacturing Survey (EAM) provided by DANE.

The weight of the SME sector in manufacturing output (value added) in Colombia is lower than one would expect (compared to other countries); it was around 30% until the 1990s and in 2005 it was slightly more than a quarter. It is supposed that SMEs can increase labour productivity more quickly than larger firms; they are also more dynamic, and flexible in adjusting in moments of adverse shocks. This is why they have an important role in any nation's economy. The role that larger firms play becomes important given their levels of labour productivity (more than twice when compared to SMEs).

Empirical evidence shows that just because a firm is involved in an export oriented sector, this does not guarantee that this particular firm will or not will export. Manufacturing exports are explained by firms' productivity and firms' size with no consideration of subsectors. Firms that participate in international markets are not specialized in exports: less than 15% of firms export more than 50% of their output, and more than 60% of firms export less than 20% of their output. An interesting fact, obtained from the industrial censuses, is that 23.5% of firms in Colombia export and 57% of labour force is employed in establishments that export. But for these export-oriented firms, their primary market is still the domestic market and only a 3% of them export more than 90% of their output (Ter Wengel, 2006). Large firms, through their relative weight on total manufacturing, determine the changes in overall labour productivity as well as in overall exports. In the following table, the decomposition exercise is carried out by size-class for the last period of economic recovery.

**Table 8: Salaried Employment and Decomposition results by size of manufacturing establishments, 2001-2005**

Size Class	(1) Output effect ( $\alpha \dot{Q}$ )	(2) Real Wages ( $\dot{w}$ )	(3) Wage share effect ( $(\alpha - 1)\dot{P}_p$ )	(4) DRER ( $\dot{P}_p - \dot{P}_c$ )	$\alpha$	Price effect	Employment ( $\dot{L}$ )	Real Value Added Growth ( $\dot{Q}$ )	Elasticity ( $\dot{L}/\dot{Q}$ )
Small 10-49	3.44	0.90	-1.35	-0.56	0.68	-1.91	0.63	5.08	0.12
Med 50-199	0.43	0.73	0.57	-0.56	1.14	0.01	-0.29	0.38	-0.77
Large 200-499	3.25	0.45	-2.23	-0.56	0.47	-2.79	0.01	6.99	0.00
Very Large >500	2.68	0.09	-2.56	-0.56	0.39	-3.12	-0.53	6.92	-0.08

Source: Author's calculations based on multiple rounds of the Manufacturing Survey (EAM). See Annex 3 for values by different time periods.

In recent years (**Period V**), despite the increase in output (value added) in small and larger firms, employment and wages have remained stagnate. This can be explained by the decline in the share of wages of value added among size-classes particularly for those small and larger firms. This means that the positive effect of producer price inflation has been mainly appropriated by capital, leaving a small portion of value added to be distributed between employment and real wage growth. Additionally, the relatively small increases in real wages have been diminished by the negative effects of the DRER. Only small firms have created new employment opportunities for workers: one percent increase in output is associated with a 0.12 increase in employment (these values are lower when compared to previous periods). In the other

size-classes, employment has remained stagnate or have even declined (see Table 8). The behavior of medium-sized firms has determined the performance of total manufacturing given the marked decline in employment growth that was influenced by low levels of output and by orienting the benefits of the positive wage share effect mainly to increase real wages.

Output growth (value added) in the SMEs exceeded the average for the manufacturing sector until the recession at the end of the 1990s; and recently, since output has resumed, growth has been concentrated mainly in smaller and larger firms. In the decomposition model for the different periods of analysis, the negative price effect reflects a strong leakage from the growing output available for distribution either as employment growth or real wage growth.

To reiterate, the price effect consists of two elements: a) the wage share effect, that is negative if ' $\alpha$ ' is less than one and b) the domestic real exchange rate (DRER). Besides the negative trend in the DRER, which has been significant for all size groups, it is clear that the wage share effect has performed differently within industry groups. In the first period (1974-1980), only in medium-sized firms was ' $\alpha$ ' around unity, while being lower in the other sized firms. During the contraction of the economy in the first half of the 1980s the value of ' $\alpha$ ' for larger firms was unusually higher than the others. It can be seen that overall groups tend to have low levels of ' $\alpha$ ' particularly after the 90s. In this regard, it is clear that the real wages and employment increased at a slower rate than output (value added) did.

From the perspective concerning employment growth vs. real wage growth, it can be seen from the decomposition exercise that SMEs behave differently among periods: small firms tilted strongly towards real wage growth during all periods. This is in sharp contrast to the experience of medium establishments: the trade-off was tilted towards employment growth especially when there was expansion in output growth. This behavior changed completely during the 2000s, the gains of output growth were appropriated by capital with a relatively small increase in real wages at the expense of

employment growth. In this last period it is clear that the wage share is lower as firms become larger, favoring capital accumulation.

It is important to note that, when economic expansion has taken place in recent years, small firms tend to increase real wages more than those medium and larger enterprises. This takes into account the fact that the wage share parameter is higher in smaller enterprises when compared to the rest of the size-classes. The increase of informal activities, or alternative earnings, outside of formal manufacturing would have led to an upward pressure on wages in small enterprises. It is possible that institutional factors, such as mandated minimum wages, have impacted small firms disproportionately.

Comparing the results from the aggregate results of the manufacturing sector, it is interesting that the first period has been identified as a period where both employment growth and real wage growth took place in a virtuous way (similarly to what occurred in South East Asia), but these benefits were concentrated for those workers involved in medium and larger firms. In period III (1985-1994), employment and the real wage grew consistently. Unfortunately the negative effects of prices undermined wages, but an important positive wage share effect indicates that producer price inflation has benefited workers' wage bill.

In conclusion, there are marked differences between pre and post-reform periods (III and V). In both cases output resumed, however output (VA) growth changed from being concentrated in smaller firms to larger firms (>200 employees) and to a lesser degree, in smaller businesses (10-49 employees). Wage growth has a strong relation to the size of firms: it is higher in smaller firms during periods when output resumes. In this regard, the wage-employment trade-off was tilted towards employment for medium and large firms (period III) and interestingly, towards wage growth (period V) for smaller firms. The elasticity of the wage bill with respect to value added ( $\alpha$ ), has also changed in the opposite way, with a lower wage share effect in smaller establishments than larger firms (Period III), to a lower wage share effect in large firms than those

smaller (Period V), which drastically reduced employment elasticities. Labour productivity in large and very large firms, on average, increased considerably and, at the same time, their share in total manufacturing output increased after reforms.

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## 6. Concluding Remarks

The objective of this study was to analyze the absorption of the labour force into economic activities given the variations of output growth, considering the latter as the main determinant of the level of employment. A one-percent increase in output growth is associated with around a one-third increase in employment growth. This value is even lower when considering salaried workers in the manufacturing sector, in which increases in average earnings, adverse domestic terms of trade, and a decline in the wage bill elasticity of output (VA), have limited employment growth during upturns.

The capacity of growth to generate an adequate number of jobs of good quality is limited. Increasing the ability of the economy to generate a sufficient number of jobs should be a priority. The employment elasticity of output growth when expansion took place was 0.31 (after structural reforms), given the limited capacity of the tradable sector (around 30% of total employment) to generate new job opportunities. Several aspects may affect employment elasticity: economic cycles and gloomy expectations about future and present downturns (and duration of upturns) that affect firm behavior and investment decisions; a high proportion of traditional exports in tradables; labour reductions to achieve productivity gains at the firm-level; labour institutions and regulations.

Reforms have brought modest results. In 2007, Colombia's economy had its highest rate of output growth in the last 30 years but disappointing results regarding employment growth. The limited capacity of the economy to generate better and more employment opportunities for the growing population despite the important rates of growth after 2003, has limited the opportunities available to reduce poverty. International trade has favored large firms and to a lesser extent small businesses,

particularly those that are more technologically advanced. High-technology and heavy industries exposed to international markets have not been able to create a considerable amount of jobs despite their outstanding growth rates. The role of domestically-oriented heavy and light industries, particularly small firms, increases when the creation of new job opportunities during the last upturn is considered.

Manufacturing's subsectors are promising as generators of good quality jobs. Despite the frequency of economic cycles, certain manufacturing subgroups have shown stable employment elasticities for salaried workers with increases in labour productivity. An important aspect is that the manufacturing sector does not consider short-term employees hired through outsourcing firms, and explains the drop in total employment as this short-term employment replaces regular salaried employment.

Despite growth being concentrated particularly in small and large firms, the labour productivity gap has widened considerably between these two groups. During the last upturn, small firms created employment opportunities for Colombian workers and employment has remained stagnant in large firms (and declined in medium and very large firms). In this regard, greater investment (and specific policies to promote it) are needed to support the adoption of new technologies for SMEs, such as ICT technologies to increase their labour productivity and to help them integrate more effectively into global markets.



# Appendix

## ANNEX 1

### An employment growth decomposition model for the manufacturing sector

Mazumdar (2000) decomposes the determinants of the employment growth: the rate of growth of output, the trend share of wages, the rate of employment growth, the relative price effect, and the real wage rate growth. The relationship between the wage bill  $S_w$  and value added  $V$ , both in current prices, can be expressed in the following way:

$$S_w = V^\alpha$$

In which  $\alpha$  is a technological and behavioral parameter which is assumed to remain constant over the period of observation. If  $\alpha$  is equal to unity the share of wages remain constant, while a value higher than unity suggests that the wage bill increases relatively to value added and the share of gross operating surplus declines. In relative terms:

$$\frac{dS_w}{S_w} = \alpha \frac{dV}{V} \Rightarrow \dot{S}_w = \alpha \dot{V}$$

Where: $\alpha = 1$	The nominal wage bill grows as fast as value added
$\alpha > 1$	Wage bill grows faster than value added and the share of the wage bill in value increases relative to the share of gross operating surplus or capital
$\alpha < 1$	Value added grows faster than nominal wage bill, and the latter decreases in value relative to the share of gross operating surplus

Then, growth in value added can be written as the sum of growth in real value added and the change in the producer price index:

$$\dot{V} = \dot{v} + \dot{P}_p$$

Where  $\dot{v}$  is the growth rate of value added and  $\dot{P}_p$  is the producer price inflation. In the same way can be interpreted the growth in the nominal wage bill:

$$\dot{S}_w = \dot{w} + \dot{P}_c + \dot{L}$$

Where  $\dot{w}$  is the growth in the real wage rate,  $\dot{P}_c$  is the consumer price inflation and  $\dot{L}$  is growth in employment.

Combining the previous equations we have:

$$\dot{S}_w = \alpha(\dot{v} + \dot{P}_p)$$

Combining value added and nominal wage bill equations:

$$\dot{w} + \dot{P}_c + \dot{L} = \alpha(\dot{v} + \dot{P}_p)$$

$$\dot{L} = \alpha\dot{v} - \dot{w} + (\alpha\dot{P}_p - \dot{P}_c)$$

By the previous equation, employment ( $\dot{L}$ ) can be seen to be equal to an output effect ( $\alpha\dot{v}$ ), minus real wage per worker ( $\dot{w}$ ), and a price effect ( $\alpha\dot{P}_p - \dot{P}_c$ ). The last part of the equation can be decomposed to:

$$\dot{L} = \alpha\dot{v} - \dot{w} + (\alpha - 1)\dot{P}_p + (\dot{P}_p - \dot{P}_c)$$

Where  $(\alpha - 1)\dot{P}_p$  is known as the wage share effect, and the difference between producer and consumer price indexes are known as the domestic real exchange rate (DRER). On the previous equation, the wage share effect can only be negative if  $\alpha$  is negative. In this regard, employment and real wage growth are negatively effected, since with a declining wage share, the increase in the producer price is to a larger extent appropriated by capital, in the form of gross operating surplus. The same thing happens with DRER, if consumer price inflation (non-tradable goods) is higher than producer price inflation (tradable goods), then real wage is eroded. From the previous equation it is clear the inverse relation between the employment effect and real wage growth.

## ANNEX 2

### Employment Elasticities of Growth by Manufacturing Groups

Period	Employment growth ( $\dot{L}$ )	Real Value Added growth ( $\dot{Q}$ )	Elasticity ( $\dot{L}/\dot{Q}$ )
<b>Period I: 1974-1980</b>			
Light Industry	1.56	4.60	0.34
Heavy Industry	1.86	5.93	0.31
Hi Tech Industry	2.89	4.58	0.63
<b>Period II: 1980-1985</b>			
Light Industry	-2.52	2.69	-0.94
Heavy Industry	-1.77	-0.98	1.81 (*)
Hi Tech Industry	-3.27	0.85	-3.83
<b>Period III: 1985-1994</b>			
Light Industry	3.25	4.13	0.79
Heavy Industry	2.33	7.62	0.31
Hi Tech Industry	2.90	4.23	0.69
<b>Period IV: 1994-2001</b>			
Light Industry	-3.00	1.39	-2.16
Heavy Industry	-4.53	1.41	-3.20
Hi Tech Industry	-4.64	-0.13	34.42 (*)
<b>Period V: 2001-2005</b>			
Light Industry	-1.00	3.50	-0.29
Heavy Industry	1.21	5.01	0.24
Hi Tech Industry	1.10	6.48	0.17
<b>All: 1974-2005</b>			
Light Industry	-0.06	3.69	-0.02
Heavy Industry	-0.18	4.59	-0.04
Hi Tech Industry	-0.12	3.44	-0.04

**Source:** Authors' calculations based on multiple rounds of the Manufacturing Survey published by DANE.

#### Notes:

(\*) Means that both employment growth and output (VA) growth rates are negative.

**Light Industry** - Food and Beverage products, tobacco products, textiles and clothing, leather and shoes products, wooden products, furniture, and paper and printing.

**Heavy Industry** - Chemical and other chemical products, refined petroleum products, rubber and plastic products, non-metallic mineral products, glass and glass products, basic metal products, basic precious and non-ferrous metals, fabricated metal products

**High-Tech Industry** – Machinery and equipment, electrical machinery and apparatus, motor vehicles and other transport equipment, medical and precision instruments, and manufacturing n.e.c.

**ANNEX 3**  
**Decomposition results by size-classes of manufacturing establishments**  
**(1974-2005)**

Size Class	Employment Growth	Real Wage Growth	Real Value Added Growth	DRER (Pp-Pc)	$\alpha$	output effect ( $v^*\alpha$ )	wage share effect $Pp^*$ ( $\alpha-1$ )	price effect	$l'/q'$
<b>Period I: 1974-1980</b>									
Small 10-49	-0.23	3.21	5.46	-0.55	0.92	5.04	-1.51	-2.06	-0.04
Med 50-199	1.97	0.72	3.15	-0.55	1.00	3.16	0.08	-0.48	0.63
Large >200	2.38	0.79	5.58	-0.55	0.93	5.17	-1.45	-2.00	0.43
<b>Period II: 1980-1985</b>									
Small 10-49	0.96	1.89	3.97	-0.12	0.95	3.79	-0.82	-0.94	0.24
Med 50-199	-1.41	3.07	3.56	-0.12	0.92	3.26	-1.48	-1.60	-0.40
Large >200	-16.42	2.48	-15.34	-0.12	1.70	-26.10	12.28	12.16	1.07(*)
<b>Period III: 1985-1994</b>									
Small 10-49	1.13	1.53	6.45	-1.92	0.93	6.01	-1.43	-3.34	0.18
Med 50-199	3.08	1.19	5.88	-1.92	1.01	5.95	0.24	-1.67	0.52
Larg.200-499	3.91	0.79	6.07	-1.92	1.02	6.19	0.43	-1.49	0.64
V-Large >500	2.43	0.59	3.92	-1.92	1.04	4.08	0.85	-1.07	0.62
<b>Period IV: 1994-2001</b>									
Small 10-49	-4.20	0.64	-3.84	-0.16	1.05	-4.04	0.64	0.48	1.09(*)
Med 50-199	-3.18	1.26	1.98	-0.16	0.74	1.46	-3.23	-3.39	-1.61
Larg.200-499	-3.63	1.26	1.20	-0.16	0.75	0.90	-3.10	-3.26	-3.01
V-Large >500	-3.54	1.83	2.53	-0.16	0.72	1.83	-3.37	-3.53	-1.40
<b>Period V: 2001-2005</b>									
Small 10-49	0.63	0.90	5.08	-0.56	0.68	3.44	-1.35	-1.91	0.12
Med 50-199	-0.29	0.73	0.38	-0.56	1.14	0.43	0.57	0.01	-0.77
Larg.200-499	0.01	0.45	6.99	-0.56	0.47	3.25	-2.23	-2.79	0.00
V-Large >500	-0.53	0.09	6.92	-0.56	0.39	2.68	-2.56	-3.12	-0.08
<b>All: Period 1974-2005</b>									
Small 10-49	-0.49	1.83	3.71	-0.86	0.93	3.45	-1.25	-2.11	-0.13
Med 50-199	0.25	1.53	3.74	-0.86	0.95	3.55	-0.90	-1.76	0.07
Larg.200-499	0.42	0.97	4.99	-1.08	0.88	4.37	-1.90	-2.98	0.08
V-Large >500	-0.36	1.00	4.47	-1.08	0.86	3.85	-2.13	-3.21	-0.08

Source: Authors' calculations based on multiple rounds of the Manufacturing Surveys .

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K1P 0B2

**Tel:**

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**Fax:**

(+1-613) 563-0815

**E-mail:**

ggp@idrc.ca

**Website:**

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